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CATEGORIES OF FAUNAL AND FLORAL ECONOMIC RESOURCES OF THE NATIVE COMMUNITIES OF THE PERUVIAN AMAZON IN 1993

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ABSTRACT.—Categories derived from names for fauna and flora reported on the First Census of the Indigenous Communities of the Peruvian Amazon in 1993 are discussed. Sources of variance and ambiguities, decisions made to prepare coding categories for tabulation and statistical data, and methods used to reference local names for life forms to Latin binomial names are detailed. The words originating in respondents' languages actually reported, the raw frequencies of reports for these terms, and their probable biological references are presented. Some alternative methods are recommended which may permit collection and processing of precise information by overcoming cultural and linguistic differences between local respondents and Western sciences.

RESUMEN.—Se discuten las categorías derivadas de los nombres para la fauna y la flora reportados en el Primer Censo de las Comunidades Indígenas del Amazonas Peruano en 1993. Se detallan las ambigüedades y fuentes de variación, las decisiones tomadas para preparar categorías de codificación para los datos estadísticos y la tabulación, y los métodos empleados para referir los nombres locales de formas de vida a nombres binarios en latín. Se presentan las palabras que fueron reportadas en las lenguas de las personas censadas, las frecuencias crudas de reportes de estos términos, y sus probables referente biológicos. Se recomiendan algunos métodos alternativos que pueden permitir la recopilación y procesamiento de imformación precisa superando las diferencias culturales y lingüísticas entre las poblaciones locales censadas y las ciencias occidentales.

RÉSUMÉ.—Dans cette étude, nous examinons les catégories associées aux noms de plantes et d'animaux rapportés dans le Premier Recensement des Communautés indigènes de l'Amazonie péruvienne de 1993. Nous décrivons les sources de variation et d'ambiguité, les décisions prises relatives à la création des catégories utilisées dans les tableaux et le traitement des données statistiques, ainsi que les méthodes suivies pour établir les relations entre les noms vernaculaires des entités biologiques et les binômes latins. Nous présentons les mots tels que rapportés dans les langues des répondants, la fréquence de ces mots et leurs référents biologiques probables. Nous proposons enfin des méthodes alternatives qui devraient permettre d'améliorer la cueillette et le traitement de l'information en surmontant les différences culturelles et linguistiques entre les répondants locaux et les sciences occidentales.

INTRODUCTION

The First Census of the Indigenous Communities of the Peruvian Amazon collected word lists of faunal and floral resources used in the economic activities of native communities located in the South American tropical lowlands. I report methodological steps, some results, and issues related to defining census categories from answers to questions that elicited word lists from over a thousand linguistically and culturally diverse respondents. The census section on economic characteristics of the native community began with the general question, What activities do the families in the community pursue? ("*¿ Cuales son las actividades a que se dedican las familias de la comunidad?*") Seven types of economic activity were pre-coded as the answers to this question: Agriculture, Fishing, Raising Livestock, Extraction, Gathering, Handicrafts, and Other (See Table 1). If Agriculture, "Collecting," or Hunting were reported then the respondent was asked to specify. The census form had answer lines for up to seven agricultural crops and, for each crop specified, asked whether it was for subsistence, cash sale, or both subsistence and sale. The form had lines for up to five answers for items "collected" and for animals hunted.

Two additional questions, similarly open-ended, collected types of timber and construction material. The question, What varieties of timber are extracted in the community? ("*¿Que variedades de madera extraen en la comunidad?*") requested the respondent to name up to twenty. Another question asked respondents to indicate what type of wood or other material was predominant in the key components of their houses–beams, walls, roof, floor, and so on—and how long the wood or other material lasts. ("*¿En la construcción de viviendas de la comunidad, indique el tipo de madera o material predominante y el tiempo de duración de vigas o largueros? ¿ tijerales ? ¿ cumbreras ? ¿ horcones ? ¿ piso ? ...*")

FIRST CENSUS OF INDIGENOUS COMMUNITIES OF THE PERUVIAN AMAZON

The First Census of the Indigenous Communities was conducted in July 1993 during the enumeration of Peru's Ninth Census of Population and Fourth Census of Housing by the National Institute of Statistics and Information (*Instituto Nacional de Estadística e Informática*, abbreviated as INEI). The Peruvian Amazon was defined geographically by selected rural provinces and districts located in seven regions of Peru (Loreto, Andes Avelino Caceres, Ucayali, Inca, Los Liberatores Wari, Nor Oriente del Marañon, and San Martin). The area defined descends west to east from Andean high cloud forest and grasslands to the Amazon floor. This first community-level census enumerated named settlements legally recognized or eligible for recognition as native communities (*Comunidad Nativas*, abbreviated as CCNN) under Peruvian laws D.L. 20653 and D.L. 22175.

Native communities are corporations of members who belong to one of the 64 Amazonian Indian "ethnic groups" (*etnías*) acknowledged by the Peruvian state. Native communities may own or claim land. Of the native communities enumerated in this first census, about 64% reported they held land titles and another 26% were petitioning for titles to their land. A quarter of the communities reported

holding between one and 999 hectares and 17% reported they have no common territory. The mean size of land base reported was 5,267 hectares; holdings ranged from no land to a territory of over 100,000 hectares claimed by one untitled community. The population size of settlements INEI coded as native communities in the simultaneous Ninth Census of Population and Housing ranged from nine persons to 998 (INEI 1993). INEI's preliminary estimate of the total population residing in enumerated native communities was 192,295 persons (INEI 1993). This figure, while interesting, should not be considered as the total population of Amazonian native peoples in Peru in 1993. Since this was a census, INEI sought to interview in all the native communities, however more native communities exist in the Peruvian Amazon than were enumerated and native Amazonians live in other types of rural and urban settlements.

This first census of native Amazonian communities faced cultural and language barriers between the respondents and census enumerators, between respondents and statisticians, and between statisticians and the primary customers for information which were the native communities themselves. The designated respondent for the community report was the recognized political authority who reported for the families of the settlement as a whole. The communities enumerated included speakers of at least 40 highly differentiated languages in the Arawak, Caribe (Peba-Yaguan), Harakmbet, Jivaroan, Panoan, Quechua, Tacaman, Tucanoan, and Witítoan families of languages. The census form was in Spanish. INEI's field staff and native Amazonian witnesses whom I interviewed agreed that most of the census takers were hired in district capitals and conducted interviews in Spanish, using translators if necessary. Although Amazonian ethnolinguistic groups in Peru use Spanish as a general language to interact with those who do not speak their language and about half the native communities reported their members spoke some Spanish, half reported that their members did not speak any Spanish. The native communities that reported their members spoke some Spanish included 37% where Spanish was the second language spoken, 2.5% where it was spoken in combination with two Amazonian languages, and just under 10%, mainly Cocama-Cocamilla or lowland Quichua communities, where Spanish was the first language. Most words transcribed on the forms were in the lexicon of the local Spanish which incorporates words and roots derived from Quechua and other New World native languages into its standard vocabulary.

INEI collected 1,298 original community census reports from 1,175 unique native communities and 123 district neighborhoods of larger, more dispersed native communities. Despite incomplete coverage of native communities, this census provides recent and comprehensive information about rural native Amazonian Indians in Peru. INEI is publishing results from this census in a series entitled *Colección comunidades nativas*. Numbers published by INEI will differ from the frequencies and percentages reported here from the preliminary data set. The tables published by INEI eliminate names of biological resources reported by a minority of the communities and group types of resources. I believe the biological resources reported in the "raw" information collected on census forms are intrinsically interesting for ethnobiology and ecological anthropology.

METHODOLOGICAL CONSIDERATIONS

Censuses and surveys apply methods to gather information from a large number of respondents on the egalitarian assumption that any respondent can answer the questions posed. Respondents' answers are filtered and structured by questionnaire designers, interviewers, interviewer-respondent interaction, and data processing. Census methodologists strive to use terms in questions that elicit defined, precise responses appropriate for the statistical tables and analyses planned. The census method values brief, unambiguous responses from many people on the same subject matter. Statistical categories are routinely defined before census data are collected, often by "pre-coded" answers to "closed" questions developed through research in ethnosemantics (*cf.*, Custred 1980). Information collected in a census (or sample survey) can be validated and analyzed by statistical tests. In the case of a census or a large, randomly selected survey sample universe, a great number of statistical tests can be applied. Patterns can be mapped geographically and documented statistically by tests of significance of cross-tabulations, correlation, regression, trend, and probability analyses.

Table 1.—Number of Native Communities Reporting the Economic Activities and Combinations with or without Agriculture.

Economic Activities	CCNN Reporting Activity Agriculture	Combined Activity with	Not Combined With Agriculture	Without this Activity
Agriculture	1281	NA	NA	17
Fishing	1137	1129	8	161
Livestock	1127	1122	5	171
Hunting	979	972	7	319
Artisanal production	849	845	4	449
Extraction [Timber]	800 [711]	799	1	498
Collecting	547	542	5	751
Other	208	207	1	1090

Notes: CCNN stands for *Comunidades Nativas*. This table shows for each economic activity, how many of the 1,298 communities reported engaging in the activity or did not report the activity.

Optimally, how what respondents say will be translated by coders, editors, and computer programmers into machine-language data sets is tested before the census or survey begins. Well established census methods require time, funding, and expertise that statistical agencies in developing countries lack. In the case of this census, INEI responded to scarcity with creativity. The data in Table 1, for example, is based on a question which defined seven economic activities that INEI designers predicted would be important among the families of native communities and elicited specification of one "other" economic activity. INEI census methodologists conservatively allowed respondents to specify "other" answers to additional questions along with defined categories. INEI left some questions in this first census completely "open-ended" if INEI had no precedent for what an-

swers might be given. These questionnaire design decisions shifted the task of defining statistical categories to INEI's processing and computer center staff after the completed forms were received.

From the point of view of data processing design and statistical methodology, the open-ended and multiple choice questions in this census posed a series of problems, especially considering the relatively small universe of cases. The primary customers for this census were its subjects: the Amazonian native communities. Their associations asked INEI to produce information useful for the native communities themselves. INEI requested help from the U.S. Census Bureau to design the processing and publication tables for this first census of native communities. I was selected to provide INEI with technical assistance. In Lima, I worked with INEI's staff to solve processing problems and simultaneously train and advise INEI colleagues in methodological procedures. In the course of my technical assistance mission, I had the opportunity to examine the original forms and analyze the preliminary data set. I report as a participant interventionist in the creation of statistical categories from the words recorded on census forms that listed faunal and floral economic resources of native Amazonian communities.

Manual coding.—Master coding lists were compiled from the answers to the open ended instructions, "—specify". The lists of agricultural crops, items collected, animals hunted, commercial timbers, materials used in house construction, and others not discussed here, remained open until clerks had hand-coded the forms and keying began. If clerks found a new word written on forms, it was brought to the attention of their supervisor. If the supervisor or INEI's Amazonian consultant recognized the word as a synonym of another already on the master list, the supervisor updated the definition of a data element. If the word was found on only one or two forms, it was assigned to a data element group for "other." If the word was found on several forms, it was assigned a numeric code and added to updated editions of the master code lists issued to clerks.

The master list of biological resources for each economic activity eventually contained between 44 and 86 data elements. Each data element was a numeric key code defined by a single word or a set of words that coders regarded as synonyms. Tables 2-6 show the name or set of names that defined the more frequently reported data elements and percentage of cases respectively reporting each. Clerks wrote the numeric codes on the census forms and these codes were keyed.

The number codes keyed reflected only the order in which new names appeared in the pile of census forms. Definitions existed on in-house data dictionaries annotated by hand and nowhere else. By contrast, for settlements, INEI used a hierarchial code which embedded the region, province, district, and name of each place, and for occupations, used a code issued by the United Nations. INEI's use of standardized codes for geography and occupation permitted data from this first census of native communities to be linked with Peru's 1993 census of population and housing.

INEI required technical assistance to group data elements into a set of progressively inclusive statistical categories consistent with its observations from the Peruvian Amazon and its plan to publish tables. No Peruvian or international

standard hierarchial numeric code for biological resources exists, although standard industrial codes in other countries refer to some products of agriculture, hunting, and forestry. Constructing a coding scheme was necessary to design processing and develop tables.

Coding Responses into Statistical Categories.—The steps taken to reduce the number of answers to meaningfully defined statistical categories were to 1) count which data elements were more frequently named, 2) recognize and equate synonyms in different Amazonian languages and in Spanish, and 3) associate vernacular terms with biological references in order to group the biological resources along the lines of scientific taxonomy. I convened a team within INEI to make decisions about the evolving coding and processing design. The team included the supervisor of manual coding, the assigned computer programmer, an Amazonian consultant, a census methodologist detailed to the Computing Center, and myself. Other INEI staff and guest consultants occasionally sat in on discussions of the emerging statistical categories and of test runs using the categories developed. Outside INEI, the Amazonian consultant, an INEI senior manager, and I recruited and met with an advisory panel from several different ethnolinguistic groups studying in Lima.

The task of grouping raw data elements into more inclusive statistical categories began after the manually coded forms had all been keyed. The number of answer categories had to be reduced in order to cross-tabulate by provinces and, separately, by ethnic groups, by river basin, and so on, without an excess of empty cells. Three criteria were progressively applied to construct statistical categories from the data elements that had resulted from manually coding the words actually written on census forms.

Table 2.—Agricultural crops ranked by percent of enumerated native communities reporting agriculture (N=1281) and ranked as first crop mentioned, second crop mentioned, and first and second combined.

Rank by percent	Percent	Local name reported, Associated English Name, Associated Latin Genus and Species	1st Named Rank	2nd Named Rank	1 & 2 Combined
1	88.7	*yuca* cassava or manioc *Manihot esculenta*	1	2	1
2	81.4	*plátanos, paranta, banano, guineo, seda* plantains & bananas *Musa* spp.	2	1	2
3	67.1	*maíz* corn *Zea mays*	5	3	4
4	47.5	*arroz* rice *Oryza sativa*	3	4	3
5	21.1	*maní* peanuts *Arachis hypogaea*	9	-	-
6	17.3	*frijol, ucayali, porotos* ***chongo*** "beans" *Phaseolus vulgaris* or *P. lunatus* or *P. mungo*	7	-	-
7	14.3	*café* coffee *Coffea arabica*	4	-	5
8	9.5	*cacao* chocolate *Theobroma cacao*	6	-	6
9	7.6	*camote* sweet potato *Ipomea batatas*	NA	-	NA
10	7.5	***sachapapa*** yam *Dioscorea* spp.	10	NA	NA
11	7.2	*azucar* sugar *Saccharum officinarum*	NA	-	NA
12	5.8	*piña* pineapple *Ananas comosus*	NA	-	NA
13	5.2	*papaya* papaya *Carica papaya, C. stipulata, C. monoica, C. boliviana*	NA	-	NA

The first criterion was frequency: a computerized count of native communities which had reported each data element using the original keyed data set. Unique data elements specified by at least five communities were preserved for a research data set and those noted by fewer than five communities were targeted for collapse. Some of those frequencies are reported here in tables.

The second criterion was to eliminate remaining synonyms and/or gather infrequently reported names into some logical yet more general categories. Unique terms from Quechua and several different native Amazonian languages augmented what statisticians call respondent variance. The processing team within INEI spoke Spanish and two of us knew highland Quechua, which is related to languages spoken in seven percent of the native communities enumerated, and the Amazonian consultant was a native speaker of the Panoan language, Shipibo-Conibo, which was spoken in 11.2% of the communities enumerated. To determine the meaning of those words for biological resources that no one at INEI understood, I sought advice from experts field biologists and native Amazonians. The Amazonian native people who volunteered their assistance included 10 speakers of the Arahuan (or "Arawak") language, Ashaninka (formerly called "Campa"), which was spoken in 25% of the native communities enumerated; speakers of Jivaroan languages, seven of Aguaruna (spoken in 17.4%) and three of Achual (3.5%); four speakers of Peruvian lowland Quechuas, three additional Conibo-Shipibo, and one speaker of the Harakmbut language, Amarakaeri (spoken in .01% of the communities). The native Amazonians recognized additional synonyms and cognates.

By the time I began meeting with the Amazonian volunteer consultants, I had associated a Latin binomial species name or higher order taxonomic group with most of the vernacular names to design test categories based on biological distributions and ethnographic reports (Brownrigg 1986, Emmons 1990, Encarnación 1983, Soukup 1988, Vasquez 1989, and Vallarejo). These associations were reviewed and expanded in consultations with Peruvian field biologists (see Acknowledgements) and in panel discussions about what fauna or flora each word named among native speakers of different Amazonian languages. They helped clarify what animal or plant the common names referenced, by supplying synonyms, answering questions I structured to eliminate some tentative identifications, elaborating descriptions, and matching names to plates and sketches shown to them.

The third criterion set five percent of the enumerated communities as the minimum threshold for statistical categories to use in testing tabulation. Terms reported by fewer than five percent of the communities, while preserved on intermediate data sets, were grouped into some category where this minimum percentage of cases could be achieved. INEI adopted my suggestion to collect less frequently reported names into more general groupings based on biological similarities.

FAUNAL AND FLORAL RESOURCES REPORTED

Tables 2, 4, and 5 display the percent of native communities that specified the more frequently named fauna or flora. In headings of columns displaying percentages, I state the denominator used. Denominators are either the preliminary universe of 1,298 forms or an eligible population from that universe, that is, the

Table 3.—Rank of varieties of woods by frequency reported used in house construction and rank by frequency reported as commerically exploited.

Local Name Reported, Associated Latin Genus and Species	Rank for House Construction	Rank for Timber Exploitation
pona (*Socratea exorrhiza*)	1	10
huacapú (*Minguartia punctata*)	2	15
despintana (*Xylopia* sp. or *Duguettia* sp.)—Annonaceae	3	18
capirona (*Capirona decorticans*)	4	12
yarina	5	NA
quinilla (*Pouteria* sp.)	6	21
cedro cedar (*Cedrela odorata*)	50	1
moena, moenilla, muenilla (laurel *Ocotea* sp. or *Nectandra* sp.)— Lauraceae	45	2
tornillo (*Cedrelinga catenaeformis*)	47	3
caoba mahogany (*Swientenia macrophylla*) or *aguano* (*Huberodendron* sp.)	NA	4
cumula (*Virola* sp.)	82	5

TABLE 4.—Items collected by percent of communities reporting collecting (N=547), and by percent of enumerated communities (N=1298).

Rank	Local Name Reported	Percent of CCNN Reporting Collecting (N=547)	Percent of CCNN Enumerated (N=1298)	Associated English Name, Latin Genus and Species
1	*aguaje*	41.3	17.4	burutí or mauritia palm *Mauritia flexuosa* or *M. vinifera*
2	*unguravi*	26.1	11	*Jessenia* bataua or *J. weberbaueri*
3	*motelo* ***ñesal/ñusa*** *tortuga de la tierra*	15	6.3	yellow-footed tortoise *Geochelone denticulata* or red-footed tortoise *G. carbonaria*
4	*frutas en general*	12	5	"fruits in general"
5	*pijuajo*	11.2	4.6	peach palm *Guilielma*(or *Bactris*) *gasipaes* or *G. utilis*
6	*chonta*	10	4.2	a palm *Bactris* sp.? *Euterpe* sp.? *Wettinia qunaria*?
7	***suri***	9.6	4	"grub"—see discussion
8	*chapaja*	7.7	-	palm leaves (Arecaceae) *Scheelea cephalotes*
9	*caimito*	6.0	-	star apple *Chrysophyllum cainito*

TABLE 5.—Game specified by 5 percent or more of the communities reporting hunting (N=979) ranked by the percent of hunting communities reporting the game.

Rank by Percent	Percent (N=979)	Local Names Reported	Associated English Name, Latin Genus and Species
1	56%	*sajino, saíno, cerdo,* ***kitaykiri***	collared peccary *Tayassu tajacu*
2	48%	*venado,* ***siwayro***	deer *Mazama americana*
3	47%	*majaz, majas picuno*	paca ***Agouti*** *paca*
4	33%	*añuje,* ***cutpe***	agouti *Dasyprocta fuliginosa* or *D. variegata*
5	29%	***sachavaca****, tapiro*	tapir *Tapirus terretris*
6	23%	***huangana***	white-lipped peccary *Tayassu pecari*
7	19%	*mono negro*	brown capuchin monkey *Cebus apella*
8	15%	*armadillo, carachupi,* ***kirquinco***	nine-banded armadillo *Dasypus novencinctus* giant armadillo *Priodontes maximus*
9	9%	*pava de monte,* ***paujil***	guan (bush or wild turkey *Penelope purpurascen* and/or curassow *Crax mitu* or *Mitu salvini*
10	7%	*perdiz*	"dove" or tinamous *Timamus tao* and others

TABLE 6.—Number of Native Communities Reported Selected Types of Livestock Raised and Animals Hunted.

Livestock Raised	CCNN Reporting	Animals Hunted	CCNN Reporting
Cattle	230	Deer and ***"Sachavaca"*** (Tapir)	801
Pigs	446	Both Peccaries	779
Turkeys	180	"Pava de monte" (Guans)	91
Chickens	1060	All other reports of birds	161
Other livestock	242	All other reports of prey	1162

number of native communities which, having reported a particular activity, were asked to specify resource details. Tables 2 through 5 show the rank of each of the more frequently reported biological resources by these percentages.

Tables 2 through 6 associate the vernacular names of the more frequently reported fauna and flora written on census forms with probable English common names and Latin names; associations for less frequently reported biological taxa appear in the text. Associating a vernacular name with a Latin binomial for a particular species was not always possible. Words reported for faunal and floral economic resources in this census were taken out of the context of respondents' and enumerators' respective folk classifications. The local Spanish and the several native Amazonian languages each have underlying "ethnotaxonomies" which classify biological taxa differently than do formal scientific systematics. Some terms

reported for faunal or floral resources in this census refer to several different species, varying by region. Some names are of intermediate or life form taxonomic rank (Berlin 1992:52-101, 135-139) referring to groups of animal or plant life forms which are formally classified in different orders, classes, genera, or species. These more inclusive terms cannot be associated with a single species. Some terms refer to one species in one part of the Peruvian Amazon and another species in other areas. I omit reference to voucher specimen or authorities because biological taxa were not conventionally identified—no specimens were collected or observed. After the fact, it was not possible to determine what animal or plant the Amazonian respondents and Peruvian census-takers had in mind when the verbal reports were recorded.

Proxies for Importance.—Because each respondent named a limited number of biological resources for each economic activity to characterize a whole community, any biological resource named should be considered important for at least one community. The census did not ask respondents to specify the crops, commercial timbers, items collected, or animals hunted by any criteria, except that census takers did request the most predominant material for house construction. I suggest that rank by the frequency and percent of native communities reporting each biological resource can be interpreted as a proxy indicating its relative economic importance or use in this universe—cautioning, however, possible biases were introduced by cultural preferences or seasonal effects. Cultural preferences could account for the higher frequency rank of prized hunting prey over more quotidian fare. The seasonal effect may favor those economic biological resources salient in July 1993 rather than of other months or other years. "Seasonal effects" are a source of error well documented in consumer expenditure, business, and recreational survey research (Silberstein and Stuart 1991, 1992; Kemsley, Redpath, and Holmes 1980). Ethnographic studies report that particular Amazonian communities cultivate, gather, fish, and hunt different living resources at different seasons following an annual round. (See Meggers 1971:47-49, 58-62, 69-72, 79-81, 89-92, and 101-102 and Lévi-Strauss 1973; among others.) Long term studies of the hunting practices of particular Amazonian native communities reveal variations by season and from year to year as the societies respond to fluctuations in the availability of game by redirecting hunting to other species or other areas (see Vickers 1991; Hames and Vickers 1983; Meggers 1971, Mashinkash Chinkias and Awak Tentets 1986; among others).

Another proxy for relative importance is the order in which respondents spontaneously specified their biological resources. I tested the cumulative number of communities reporting each named biological resource in any order and the number of communities that reported it first, second, or first or second combined and found highly significant correlations. For example, correlations for wood varieties were at .8843 for woods reported first and at .9564 for woods reported second.

Agriculture.—Agriculture was reported by 98% of the enumerated communities (N=1281/1298) which also designated it their important economic activity. Over 60% of the agricultural communities combined agriculture with raising livestock such as cattle, pigs, turkeys, and chickens, and/or with fishing, and/or with the

production of artisanal goods. Fewer communities combined agriculture with collecting or hunting or extraction, or "other activities" such as operating river boats, making canoes, and milling rice. Table 1 reports these activities. Less than one percent of the communities reported their members worked in day labor for surrounding colonists. Subsistence activities dominated, although over half of the Amazonian native communities reported cash crop agriculture or commercial timber sales in their mix of economic activities.

Crops. The 1,281 native communities that reported agriculture collectively named crops that were identified as 44 initial data elements. Table 2 lists leading crops ranked by the percentage of communities practicing agriculture and ranked according to the number of communities which named the crop first, named it second, and named it first or second.

It was no surprise to find *yuca* or cassava (*Manihot esculenta*) ranked first, plantains and bananas (*Musa x paradisiaca* and other *Musaceae*) ranked second, and maize (*Zea mays*) ranked third in a census of native communities or that these crops were primarily grown for subsistence. The agricultural crops listed on Table 2 are familiar from previous ethnographic and agricultural studies from the Peruvian Amazon. Yuca, maize, peanuts (*Arachis hypogaea*), and "beans" (mainly *Phaseolus vulgaris*) have been subsistence staples of Amazonian agriculture for thousands of years as have plantains and bananas since their introduction.

The rank of rice (*Oryza sativa*) confirms its contemporary importance and departs from earlier ethnographic and agronomic observations in native communities. Rice was fourth most often reported by the native communities practicing agriculture and third most often mentioned first. Several factors propelled a rapid expansion of rice production among native communities. Several Amazonian native groups adapted rice into their traditional inventory of floodplain (*playa*) crops (Eakin *et al.* 1980; Tournon 1988; Bergman 1990:97; among others); others adopted upland rice cultivation techniques introduced by the riziculture colonists who have been migrating from the Peruvian Pacific coast since the 1960s The rank of rice in relation to traditional Amazonian crops may index native communities' participation in the modern agricultural cash economy; most communities grew rice for subsistence and for sale.

Two crops grown almost exclusively for cash, *café* (*Coffea arabica*) and *cacao*, the chocolate bean (*Theobroma cacao*), ranked seventh and eighth. Coffee ranked fourth as the crop that communities mentioned first, following yuca, plantains, and rice, and ranked fifth as the crop communities mentioned first or second. *Cacao*, a pre-Columbian domesticate and trade good, ranked sixth by the measure of the order it was mentioned and eighth by frequency.

Two traditional subsistence root crop staples, camotes (sweet potatoes, *Impomea batatas*) and ***sachapapas*** ranked ninth and tenth respectively according to the count of communities reporting these crops. No community spontaneously mentioned the sweet potato first and ***sachapapas*** ranked tenth among the crops mentioned first. The term ***sachapapa*** means wild or fake potato in Quechua. The term ***sachapapa*** or "pseudo-potato" is used in the Amazon region to refer to the regional cultivated and wild potatoes and to other non-potato crops. Hawkes (1990) describes 'candidate' cultivated and wild potato species that grow in the Peruvian

montaña and Amazon floor. The best known 'wet and hot' potato species, *Solanum hygrotermicum* Ochoa, is named ***moiske*** or ***moshaki*** by the Ashanika or Campa. The name ***sachapapa*** can gloss Amazonian root crops such as *yuca*, however, ***sachapapa*** usually refers a yam in the genus *Dioscorea*, such as *D. trifida* (*ñame*). Sweet potatoes and yams have little market value and ranked below crops primarily grown for sale. Other names for root crops reported were ***uncucha*** (a name for the cocoyam or yautia, *Xanthosoma* sp.), *papa morada* (purple potato = *Solanum* sp.), and ***kuikui*** which may be a cognate of either ***kui*** (*Arracia xanthorrhiza*) or ***kurahiji***, another name for the tropical potato. Altogether, less than one percent of native communities enumerated specified these less frequently reported minor root and tuber crops.

Among the crops reported by five percent or more of native communities are three others that served as a source either for cash or for subsistence food. Only one community reported pineapple first, one other reported papaya first, and no community reported sugar first.

Fruit trees stood out among the 31 additional crops reported by fewer than five percent of the agricultural communities (one to 60 communities). *Naranjo*, Spanish for sweet orange (*Citrus sinensis*) trees, were reported by two percent; *palto*, the avocado or alligator pear (*Persea america* or *gratissuma*), and *pitayo* or *pijuajo*—peach palm—were each reported by 1.9%. *Mandarinas*, which is usually identified with the tangerine (*Citrus reticulata* or a *Citrus* hybrid) were reported by one percent. Fruit trees reported by less than 1% of the communities included *limón* (lemon, *Citrus lemon*), *toronja* (grapefruit, *Citrus paradisi*), ***maracuyá*** (*Passiflora quadrangularis*), *cocos* (coconut, *Cocos nucifera*) and ***anowa***, ***anona***, or *chirimoya*: three names for the fruit, cherimoya (*Annona cherimola* or *A. diversifolia*).

Achiote or *bija*, which is the red colorant dye and food flavoring, *Bixa orellana*, was reported by three percent of the communities. Combining achiote with the fruit trees listed above created an inclusive statistical category that totaled 12% of the agricultural communities.

Other crops reported by less than one percent of the communities were the condiments *aji* or chile pepper (*Capsicum* sp.) and *culandro* or coriander (*Coriandrum sativum*) and the annual field vegetables including *zapallo* squash (probably *Cucurbita maxima* or *Cucurbita moschata*), *pallares* and *habas* (Lima beans, *Phaseolus lunatus*), *sandía* (melon, *Citrullus vulgaris*), and *pepino* (see below). About three percent of the communities said one of their agricultural crops was *vitucos*, which is a general name for a side dish with a variety of ingredients or *hortalizas*, Spanish for salad greens or green vegetables generally. Non-food crops reported included *algodon* (cotton, *Gossypium barbadensis*), tobacco (*Nicotiana tabacum*) and *barbasco* fish poison (*Lonchocarpus nincou*). One community reported coca leaf (*Erythroxylum coca*).

Crop identifications. In the discussions held at INEI, the agricultural crops reported by five percent or more of the native communities were consensually associated with Spanish names that designate a botanical species or genus. The statistical staff (urban consumers) and the Amazonian native consultants (rural producers) shared a core vocabulary for food crops. Differences in the appearance, agronomic or cooking characteristics, or taste of agricultural crops inspire a profusion of pri-

mary terms for varieties in Peru, as elsewhere. The manual coding staff had grouped names for bananas (*banano, guineo, seda*) and plantains (*plátanos, paranta*) into a single data element which can be considered as crops in the *Musa* genus. Similarly, the clerks had coded as *frijoles* the regional names *ucayali, porotos,* and *chongo* which may be varieties of the common bean or introduced mung beans (*Phaseolus mungo*) or a *Vigna* species. Additional names for "beans" recognized during the recoding were ***chivango, chuvi,*** and ***hundia***. These may be popping beans or ***ñunas*** (*Phaseolus chuvis*—see National Research Council 1989), rather than common beans or mung beans. Additional names for beans and reports of Lima beans were gathered into a single coding category, which is best interpreted as "beans" of some *Phaseolus* species.

The botanic species of the more common, commercial food crops of Peru are known, well researched, and deposited in germ plasm banks (See on-line Harvard University's Gray Herbarium Index of New World Plants or Purdue University's New Crops at the World Wide Web site, http://newcrop.hort.perdue.edu). Several of the crops reported less frequently in this census are not well researched or are not firmly identified botanically. Three crops reported by less than one percent of the communities were not identified—***humbilla***, *tongarina,* and *cantrini.* Botanical associations for three other crop names, each also reported by less than one percent of the communities, are tentative. Is ***huistina*** *Sechium edule*? Is *cocona Solanum topiro*? Is *pepino* the melon pear, *Solanum muricatum* (syn. *Solanum variegatum* and *Solanum guatemalenses*), or the sweet cucumber, *Cucumis sativus* or *Cyclanthera pedada*? These elusive crops reported by very few communities were relegated to an amorphous "other" category.

Timber and house materials.—A total of 711 native communities specified they exploit at least one kind of timber and 888 communities indicated the materials they use to construct houses. A total of 52% of the communities named at least one type of wood used as a house material or exploited commercially. A single code list was compiled from responses to the requests to specify that gave respondents up to 27 chances to name timber. Consequently, 86 terms for varieties of wood exploited commercially or house construction materials were compiled from respondents, a longer list of biological resources than for the more prevalent economic activities.

Cedar (*cedro*), laurel (*tornillo),* and the mahoganies (*caoba* and *aguano)* are sold as logs for export and used to manufacture fine furniture (*Perú. Ministerio de Agricultura,* 1992). According to this first census, these highest value woods of the Peruvian lumber industry are the focus of commercial lumbering activities in native Amazonian communities.

The rank order of commercially exploited varieties of wood had little relationship to the rank order of woods specified as materials used in the construction of native housing. The cases of *cedro* (*Cedrela odorata*) and ***pona*** (*Socratea exorrhiza*) illustrate this point. Cedar ranked first among varieties of wood exploited as timber. Of the 711 communities engaged in commercial lumbering, 585 (82%) reported they exploit cedar. Cedar was the variety of wood named first by 292 of these communities and cedar was nearly five times more often mentioned first than any other type of wood. This indicates either cedar's importance for commercial ex-

ploitation or its prestige and value, yet, cedar was reported as a material for any house component by less than one percent of the communities.

Pona (or ***cashapona***) was specified by 85 or about 12% of the 711 communities as a variety of wood they exploit commercially. This placed ***pona*** in tenth place among varieties of timber exploited. ***Pona*** is a wild palm with a thick, dense, woody pith. Only three communities mentioned ***pona*** first and three others mentioned it second when they listed varieties of commercial timbers. However, of the 888 communities which specified the material most predominant used to construct house walls, 593 communities (or 66%) named ***pona***. Of the 709 communities which specified a flooring material, 579 or 81% named ***pona***. ***Pona*** therefore ranked overall as the most predominant wood in native house construction and was the only wood used for construction which ranked among those top 12 commercial varieties which five percent or more of the communities enumerated had specified.

The varieties of wood that ranked highest as house construction materials generally had low ranks as commercial timber. Table 3 displays the inverse relationship between the percentage of wood materials used in house construction compared to timbers exploited commercially. For house construction, plant resources other than timber are important, including materials such as palm fronds or leaves, *caña brava* (which usually refers to one of the false bamboos), and *shapajo* (see Collecting, below). Of the 1032 communities which specified the material predominant in the roofs of houses, 38% reported palm fronds, 11% reported *shapajo*, and 7.5% reported leaves in general. ***Shapajo*** (variant names: ***shapaja***, ***chapaja***) is *Scheelea cephalotes* in the palm family.

Identification of timber woods and building materials. Finding an English common name, Latin name, or a plant family to associate with the vernacular names reported for timber woods and building materials was more difficult than associating the crops and hunting prey. Neither INEI staff nor the native language consultants could identify many of the timber names. I consulted experts who suggested Latin names usually associated with vernacular names for the most commercially important woods. The professional foresters, forestry officials, and field botanists whom I consulted associated less than half the woods reported used in house beams or struts with scientifically known family, genus, or species. Forestry officials expressed interest in what tropical hardwoods, unknown to them, the communities reported endured for decades.

Many more names for timber turned out to be highly generalized folk taxa covering a large number (100s) of species in one or two families than the relatively more particular names for living resources of the other economic activities. For example, *moena* and its cognates, *moenilla* and *muenilla* refer to laurels. The published literature equating vernacular names for South American woody plants with Latin binomials is often contradictory, or perhaps accurate for usage in one location but not elsewhere. (Compare Mahecha-Vega and Echeverri-Restrepo 1983 for Colombia, Acosta-Solis 1971 for Ecuador, and Gentry 1988 or *Instituto Geográfico Nacional* 1989:312-314.)

Collecting.—Respondents from 42.3% (547) of the enumerated native communities reported that "collecting" (*recolección*) is an economic activity; all but five of these communities also reported agriculture. Over half the native communities (57.7%)

did not collect and did not report any items collected. I translate "*recolección*" here as "collecting" to avoid the connotations of "gathering" and "foraging" (Hutterer 1982) as a serendipitous search for food among wild life forms. Judging from the evidence of their replies, native Amazonian respondents interpreted the activity of *recolección* to mean harvesting or picking. More types and cases of items harvested from orchards or cultivated mixed gardens were reported than items culled from the forest or at river banks. Almost every item named under "*recolección*" is "picked" or captured by hand.

The coding clerks compiled names for 49 collected items and applied a catch-all code, *frutas en general* ("fruits in general"), for additional names they recognized as fruits that were found on one or two forms. "Fruits in general" and three single items were reported by five percent or more of the enumerated native communities: *aguaje, unguravi,* and *motelo*. Ten categories of collected items were reported by at least five percent of the communities that reported collecting. The leading items collected are shown ranked on Table 4.

Harvested food plants. Aguaje is known in English as burutí or mauritia palm. *Aguaje* fruit figures as a leading non-timber forest product exported from the Peruvian Amazon, especially from Loreto and San Martin (*Ministerio de Agricultura* 1992:49, Table No. 30). *Aguaje* was reported as an item collected by 41.3% of the communities that reported collecting. *Unguravi* was reported collected by 26.1% of the communities. The pulp and oil pressed from *unguravi* fruit are foods.

Harvested plant products collected by more than five percent of the communities that collected, but less than five percent of the universe of enumerated communities were *pijuajo, chonta, chapaja, caimito, and uvillas*. *Pijuajo* was reported "collected" by 11.2% of the communities that collected. *Pijuajo* is the Peruvian name for the peach palm, *Guilielma* (or *Bactris*) *gasipaes* or *Guilielma utilis*. What 10% of collecting communities intended by *chonta* is not clear. In the Peruvian Amazon, meanings for *chonta* include a dense woody material and the fruits and edible heart of palms in the Bactris/Guilielma or Euterpe genera, *Wettinia qunaria,* and several other trees. In the northwest Amazon, the peach palm is occasionally called *chonta duro* (Shultes and Raffauf 1990:351) and *Guilielma chontaduro* is an alternative name for the peach palm (National Academy of Sciences 1975:73).

Pijuajo (peach palm) was reported collected by 61 communities and as an agricultural crop by 15 others. Ten other plant products were reported "collected" from species that are considered domesticated or cultivated in various sources and situations. These include *pan de árbol* or *pandisho*—in English, breadfruit *Artocarpus altilis; mango* (*Mangifera indica*); *sapota,* the white sapote or mamey zapote (*Calocarpum sapota or Matisia* sp.?); *uvos* or *taperiba,* the mombin fruit (*Spondias mombin* or possibly *Spondias cytherea*); *uvillas,* which may be either "grapes" *Pourouma cecropiaefolia* or the goldenberry *Physalis peruviana; caimito* (the star apple, *Chrysophyllum cainito*); and *almendras* (almonds, *Caryocar* sp.). The names *guaba, guava,* and *guayaba* are usually regarded as synonyms for *Psidium guajava,* however *guaba* or *guava* names the pod fruit of some *Mimosacae* in the *Inga* genus, usually *Inga feuillei* or *Inga edulis,* which is called the ice cream bean in English (National Research Council 1989). ***Dale*** (*Calathea allouia*), called dali or leren in English, was

reported collected in the Peruvian Amazon although it is a crop in the Caribbean (see Leren, http://newcrops.hort.perdue.edu/).

The names supplied for "collected" products spontaneously listed items of diverse status, some clearly "wild" like crabs and some clearly domesticated like the breadfruit and mango trees. Tree products are collected in the Peruvian Amazon from a number of different species, some domesticated, some only "cultivated" or "protected," and some, definitely wild. (Cf., Berlin 1976:392). Plants that yield functionally equivalent food or other economically useful material may have the same name, their common use justifying the label. The name *almendra* (almonds) applies to nuts from wild and cultivated *Caryocar* species in the Peruvian Amazon (Patiño 1971; National Academy of Sciences 1975:100-103; Prance and da Silva 1973). The name *almendra* is commonly used in Peru for the nut elsewhere called "*castaña*" or Brazil nut. The three communities in Madre de Dios that reported collecting "*almendra*" may harvest the wild *Bertholletia excelsa* that grows in that area.

The dual reporting of *pijuano* and other domesticated trees as agricultural crops and as collected items prompts the comment that domesticated trees (and other cultivars) may be erroneously classified as "wild" in ethnographic and/or botanic sources because of assumptions made about the status of these crops from the nature of their harvesting. The domesticated status of many Neotropical tree crops has been further clouded by their capacity to survive in feral form and "seed" the forest fallow at sites where a village and gardens were abandoned (Denevan 1974:105; Brownrigg 1986:77-84, 110-114; among others). I hope that botanical research on the hypothesis of the "anthropogenic forest" (or "semi-silvaculture", Brownrigg 1986: 113-114) will clarify which domesticated tree crops can survive as feral in the Amazon region and which domesticated trees are planted for harvesting long after gardens are otherwise in forest fallow. In the meantime, the assumption that "gathered" items are "wild" or "feral" should be suspended.

Non-food plant products collected were leaves in general, ***chapaja*** or ***shapaja***, and chonta. ***Shapaja*** was reported as a material used in housing construction: this palm's fronds are widely used to thatch roofs and make walls. *Chonta*, as noted above, may refer to the woody palm piths or tropical hardwoods that are used to make lances, arrow shafts, bows, and other hand-made artifacts.

Animals and animal products collected. The tortoise and "grubs" were the leading animals reported collected. A total of 15% of the 547 collecting communities reported the land tortoise, naming it in Spanish as *motelo* (which means "motel" and is a joke name) and *tortuga de la tierra* (land turtle) and as *ñesa* and *ñusa*. The land tortoise was concurrently named as game by about three percent of the communities reporting hunting (see below). Totaling together reports it was collected and hunted, 8.8% of the native communities enumerated reported this biological resource, which in the Peruvian Amazon is either the yellow-footed tortoise, *Geochelone denticulata*, or the closely related red-footed tortoise, *Geochelone carbonaria* (Alderton 1988). Five times more communities characterized acquiring tortoises as "collecting" than hunting. This may reflect a perception that catching this slow moving animal is not as purposeful as hunting and may signal a distinction between "collecting" and hunting activities. A distinction might be based on age or gender of participants or the stated objectives of forays. Tortoises may be captured

during forays primarily intended for collecting leaves or fruits or during organized hunting expeditions. Strikingly similar ethnographic accounts describe how Shipibo, Sharanahua, and Siona-Secoya, and elsewhere in the Amazon, Kayapo, hunters capture and carry home alive tortoises they happen to find, disable their leg tendons, and keep tortoises alive to stock house pantries (Bergman 1990:139; Siskind 1973; Vickers 1991:74; Meggers 1971:72).

Among the fauna and faunal products less frequently collected were turtles or their eggs: 20 communities reported they collect ***taricaya***, the yellow-spotted Amazon river turtle *Podocnemnis unifilis*) or *huevos de* ***taricaya***, its eggs; five communities reported collecting *huevos* ***chorapa*** (the eggs of the Arrau river turtle, *Podocnemis expansa*, or another of the Pelomedusidae family of Amazonian river turtles) and one community collected the **mata mata** (*Chelys fimbriatus*) turtle.

The item ***suri*** which was reported by 9.6% of the communities reporting collecting or about four percent of the enumerated native communities illustrates the problem of vernacular names. Based on advice from INEI's native Amazonian consultant, INEI coders defined ***suri*** as *"gusano"* which means larval worm or grub in Spanish and suggests insect larvae. Ethnographic reports on insects consumed by Amazonian native groups are scattered and brief, as is the case for tropical forest peoples generally (Hutterer 1982). Descriptions note Peruvian Amazonian groups collect, tend, and cull preferred larvae, activities which could be viewed as microlivestock production with protected wild species. The "Jivaro" regard the larvae of the *chonta* palm beetle as a delicacy; its flavor "has been compared to pork sausage spiced with nutmeg" (Meggers 1971:61). Achual spot and cut down diseased palms, haul sections with larval nests to housesites, and scoop grubs from the felled trunks to provide a rich, valued, and convenient source of protein meat. Ashaninka raised larvae of a maize pest in cribs on shucked corn cobs (Denevan in:Lyons 1974:105).

I reserve doubt that ***suri*** is insect larvae. It was described as aquatic. The Ecuadorian Shuar group characins, minnows, catfish, and their relatives into the ethnozoological "order" ***tsarar***, one variety of which is called ***tsuri*** in Shuar, the Jivaroan language that commingles and adjoins the Achual speakers of Peru. Ecuadorian Shuar authors Mashinkiash Chinkias and Awak Tentets (1986) describe the "order" ***tsarar*** with the Quechua word, ***caracha***. The Quechua word ***caracha*** is applied to crust, scab, itch, mange, even llama lice (Fernandez de Cordova 1982). During the prime fishing season, when the forest flowers and the headwaters rivers are full, ***carachas*** are "found in great numbers, up to 20-30 on one rock...and are picked up by hand" [they are smaller fish (*"sardina"* in Spanish) that]... "live in rivers attached to rocks by a sucker in its mouth" (Mashinkash Chinkias and Awak Tentets 1986). This description fits the *Loricariidae* order of catfish, which have plate-like suctorial lips located under their heads (Herald 1961:122-123). The fish (*Ancistrus* sp.), named *"raspa balsa"* in Spanish for its characteristic behavior of adhering to logs floating in rivers as well as to rocks (Patzelt 1979), is an example of this order. A small fish caught by hand fits the profile of items collected and descriptions, however, ***suri*** might also be leeches, snails, egg cases, or eggs of waterbirds. In Quechua, ***suri*** names the South American ostrich or rhea *(Pterocnemia pennata*) found in the Peruvian high altitude (Parker *et al*. 1982:29) to about 3000 meters above sea level but not in the Peruvian Amazon (Gentry 1990:252-269,

Appendix 14.1.). In versions of South American myths, the duck is interchanged with the ostrich as a story character (See Lévi-Strauss 1973). Although a duck, heron, or another water bird would be an odd item to collect, the item actually collected might be the bird's eggs, as seen in the communities that reported eggs of turtles by the name of the turtles.

Other animals or animal products reported collected by fewer than four percent of the communities are non-vertebrates. Names for the microfauna reported collected are so generalized as to refer to phyla and, at our present stage of knowledge, are difficult to associate with a species, genus, or order. The non-vertebrates include terrestrial or freshwater snails, mollusks, and bi-valves (*congompe*, *caracoles*, and *churos*), crabs, and honey. The name "shell" (*caracol*) may refer to shell material used to manufacture ornaments and tools or to the many terrestrial and freshwater snails and mollusks consumed as food. *Churos* is a general Peruvian name for bivalve mollusks of a certain shape, applied to different species according to regional Spanish dialect. The name also applies to a particular oversized snail and a grape-like fruit. Despite the mythical importance of honey in Amazonian cultures, only one community enumerated reported collecting honey. This may be a "seasonal effect" because honey is ritually reserved for collection during or prior to the time for certain ceremonies (Lévi-Strauss 1973:32, 75-76).

A sufficiently large and representative portion of the universe of this census reported collecting non-vertebrates to warrant closer examination of their status in the diet of Amazonian Peruvian communities. If reports of ***suri*** are defined as insect larvae and included, a total of 21.7% of the collecting communities reported some non-vertebrates or non-vertebrate products; if reports of ***suri*** are excluded, then 12% of the collecting communities reported some non-vertebrate or non-vertebrate product. Although the consumption of insects and non-vertebrates not regarded as "food" in Western cultures has been characterized as an adaptive responses to (macro) game depletion (Gross 1975; Hames and Vickers 1983; among others), insects and non-vertebrates constitute a large gross biomass and are an excellent source of protein available in abundant variety in the Amazon basin and in tropical forests generally (Hutterer 1982). Native Amazonian peoples' regard for non-vertebrate micro-game was apparent in the frequency of reports in this census.

Fishing.—This census did not request communities to specify what kind of fish they caught although 88% of the communities reported they fished. This omission of detail about fish leaves a major gap in the inventory of biological resources used by native Amazonian communities compiled in this census. Nonetheless, among fauna reported hunted, communities reported the large fish, *zungaro* (*Trychomiterus* sp.), which is speared and is the prey of organized expeditions.

Hunting.—Nine hundred and seventy nine (979) native communities hunted, which is 74% of the universe enumerated; seven of the hunting communities did not practice agriculture. The names of 59 animals hunted and a 60th "other" category were compiled during manual coding. After clarification of synonyms and association with biological taxa, the list was found to refer to 54 species or groups of macrofauna. Names for the wild macrofauna can be fairly confidently associated

with one species if there is only one species in its genus or class in the Peruvian Amazon. This is true for the capybara, *ronsoco*. More usually, there are two or more species which share one or more common names, discussed below.

Ten game animals were specified by five percent or more of the communities that hunted. In descending order by the number of communities reporting, these were the collared peccary (*Tayassu tajacu*), deer (*Mazama americana*), paca (*Agouti paca*), agouti (*Dasyprocta fuliginosa* or *D. variegata*), tapir (*Tapirus terrestris*), white-lipped peccary (*Tayassu peccari*), "black monkey", armadillo (*Dasyprus novemcinctus*), the "bush turkey," and the "dove," (See Table 5). Eight of the ten are larger mammals.

Mammals. Collared peccary was prey reported by 56% of the communities that reported hunting (which is 42% of the communities enumerated) with the Spanish word *sajíno* or *saíno*, which means wild boar, and a Spanish word for pig, *cerdo*. The term ***kitaykiri,*** reported by one community, may be a mistranscription of the Ashaninka name for collared peccary, ***kitáiriki*** (Weiss 1969:605). 48% of the hunting communities reported hunting deer, primarily using the Spanish name, *venado*.

The large rodents, pacas and agoutis, were respectively the third and fourth most frequently specified game. According to Emmons, pacas are "the most prized Neotropical game animal for their tender, veal-like meat" (1990:205). The names used to report the paca in the Peruvian Amazon were *majaz* or *majas* and *picuro*. None of the volunteer Amazonian native language consultants recognized the term paca and they identified photographs of both pacas and pacarinas (literally "little paca" which usually refers to juvenile pacas which have a distinctive spotted fawn and white pelage and are highly prized for their meat), as ***majaz***. A third of the hunting communities reported agouti game using either the name ***añuje*** or ***cutpe***. Of the hunting communities, 23% specified *huangana*: the consistent and exclusive name used to report the white-lipped peccary, *Tayassu pecari*.

The "black monkey" (*mono negro*) was reported as game by 19% of the communities that hunt. The native Amazonians I consulted identified photographs of the brown capuchin or cebus monkey as what they call the "black monkey." Alternative candidates include the woolly monkey and the black howler, which are larger and darker in pelage and have been ethnographically reported as preferred primate game, but are increasingly rare. The 189 reports were sufficient to preserve "black monkey" as a separate category in the data.

"*Mono*" is a Spanish general name for Neotropical primates, Cebidae and Callithricidae, and for some animals in different orders. By analogy to monkeys' appearance and habits, names for monkeys are extended to "monkey-like" arboreal mammals. The speakers of Shipibo and Aguaruna I consulted provided the Spanish term "*monos*" (monkeys) to identify primates and also several marsupials, edentates, and procyonids that spend a lot of time in trees. For Aguaruna mammal taxonomy, Berlin and Patton (1979) suggested a higher order taxon of arboreal mammals includes primates and "similar" mammals. Their insight for Aguaruna could be tested in local Spanish.

The kinkajou (*Potus flavus*) is an example of a non-primate called a monkey. The kinkajou was reported hunted by 23 communities in this first census by the names ***chosna, cuzumbo, cusumbo***, and ***cusumbi***—and there may be kinkajous in

the count of monkeys, too. The panel of native Amazonians agreed with each other that the kinkajou is a "*mono*" (monkey). Their classification mirrors the ethnozoological taxonomy of the Aguaruna (Berlin 1976 and Berlin and Patton 1979)—one of the ethnolinguistic groups censused and represented in the panel discussion—in grouping animals with distant biological relationships but similar traits. The kinkajou has the distinguishing sharp teeth of Carnivora and Procyonidae. However, the kinkajou lives in trees, is the size of several common South American monkeys, and has a long prehensile tail. Apparently these are sufficient similarities to assign the kinkajou to the folk classification of monkey.

About 17% of the hunting communities reported names associated with at least one additional primate and these reports were grouped. Twenty communities reported hunting ***choro*** (the common woolly monkey, *Lagothrix lagothricha*); 15, *coto* (the howler monkey, *Alouatta seniculus* or *A. villosa*); 14 reported *mono blanco* (the white-fronted Capuchin monkey, *Cebus albifrons*, or the white-faced monkey, *Cebus capucinus*), 34 reported *samari* and six, ***huasa***—two names that may refer to the squirrel monkey, *Saimiri sciureus*; 14 reported ***maquisapa*** or ***maquizapa***, a name associated with the white-bellied spider monkey, *Ateles belzebuth*, or black spider monkey, *Ateles paniscus*, and four reported ***pichico***, a name applied to tamarins in the Callithricidae family.

Armadillo was reported by 15% of the hunting communities. The term *armadillo* in Spanish (and English) and its synonyms *carachupi* ("sucking face") and ***kirquinco*** refer generally to the armadillo and to particular local armadillo species, depending on the group and regional usage. The nine-banded or common long-nosed armadillo (*Dasypus novemcinctus*) has the widest distribution in the Peruvian Amazon.

Additional mammals hunted by less than five percent of the hunting communities are in order of frequency the capybara (40 reports of *ronsoco* = *Hydrochaeris capibara*), the kinkajou (23) and *achuni* (11), the South American coati (*Nasua nasua*); seven reports of *liebre* or *conejo de monte*, the hare or rabbit *(Sylvilagus brasiliensis*); five of the *ardilla*, the Northern Amazonian red squirrel (*Sciurus igniventris*) or Southern Amazonian red squirrel (*S. spadiceus*); "bear" and "fox" (see below); and the Amazonian manatee (*Manati amazonica* or *Trichechus inunguis).*

Five communities reported they hunted bears ("*osos*"). Strictly speaking, the only possible bear is the spectacled bear, found in the high jungle but rarely in the low. Several other mammals have Spanish names composed with the term *oso*. Anteaters (*Myrmecophaga tridactyla* and other species) are called *oso hormiguero* or ant bear. The tamandua (*Tamandua tetradactyla*) is called *oso colmenero*. Two names for the South American racoon (*Procyon cancrivorus*) are *oso lavador* (the bathing bear) and *osito lavador* (little bathing bear). The Amazonian language consultants knew of communities that hunt "bears" and indicated the large size "*osos*" attain, the length of their claws, and how dangerous they are to hunters. Though which "*oso*" was slow to clarify, participation in the animated discussion in Spanish about hunting bears by Shipibo-Conibo from the low jungle well beyond the range of the spectacled bear served to rule it out in favor of the larger of the ant bears. *Zorro* (fox) presents the same difficulty of glosses. The tayra (*Eira barbara*) is sometimes known as a *zorro negro* or black fox; the *zarigueya* (*Didelphis marsupialis*) is known

as *zorrillo*–the little fox. *Zorrillo* is one name for the elusive wild dog, *Speothos venaticus*, usually called the *perro de monte* or *perro selvático* (Emmons 1990). Even though which *oso* and which *zorro* remained ambiguous, they were definitely mammals and it was legitimate to collapse these few cases into a statistical category for "other" mammals.

Birds. Paujil and *pava de monte* and *panguana* and *perdiz* were the game birds most frequently specified as hunting prey. The *paujil* and the "bush turkey" in the Peruvian Amazon region refer to the guan (*Penelope purpurascens*), Salvin's curassow (*Crax* [*Mitu*] *salvini*), or another of the large birds (15-20 kilograms) in the Cracidae family of guans, currassows, or chachalacas. Studies of subsistence hunting throughout the Amazon concur that this family of birds contributes "the most avian biomass extracted by hunters in the Neotropics" (Silva and Strahl 1991:37). The 65 reports of *paujil*, 22 of *pava de monte*, four of *pucacunga* (Spix's guan, *Penelope jacquacu*) and of *manacaraco* (the variable chachalaca, *Ortlalis motmot*) were merged into a single category.

The *panguana*, reported by nine communities, refers to one of the tinamous (Tinamidae, including *Crypturellus undulatus* and 10 other Peruvian species called tinamous in English). *"Perdiz,"* reported hunted by 59 communities, refers to terrestrial birds of several common species, most prominently *Tinamus tao* and other tinamous. Pigeons (*Columba* spp.) and true doves (*Columbina* spp.) fly under the vernacular name *perdiz* as well. *"Perdiz"* are hunted casually by children with slingshots and during organized hunts.

A quarter of the communities that hunt reported at least one game bird other than the larger Cracidae or "doves." Among the water game birds reported hunted by five percent or more communities were ducks and geese (Anatidae)—*pato del monte* and *pato silvestre*, herons (Ardeidae)—*garza blanca* (the white heron, *Casmerodius albus*) and *garza cuca* (the grey or white-necked heron, *Ardea cocoi*). Feral—or stray—domesticated Muscovy or tree ducks (*Cairina moschata*) were reported hunted as were wild whistling ducks (*Dendrocygna bicolor, D. viduata, D. autumnalis*), the masked duck (*Oxyura dominica*), teals and pintails (*Anas* sp.). The Neotropical cormorant (*Phalacrocorax olivaceus*) and Brazilian cormorant (*Phalacrocorax brasilensis*) are associated with the vernacular names ***cushiri*** or ***qushuri*** and ***chiwia*** reported as prey. Names for land game birds included "parrots," from one of the 14 genera of Psittacidae of the Peruvian Amazon, *guacamayo, macaw, loro* and others. The American darter (*Anhinga anhinga*) is likely the *sharara* that 10 communities reported hunting. Game birds reported by the general Spanish name *trompedero* or by Achual communities as ***chiwia*** are most likely birds in the family Psophiidae. The names of 44 additional birds reported hunted were collapsed in the data element *aves en general* "birds in general."

Reptiles. Reptiles were reported by about 14 percent of the communities that hunted. With the exception of *lagarto blanco* (the smaller caiman, *Caiman sclerops*), reptiles were reported using a local Spanish term for the order, *kiloneos*, or the names of the particular tortoise or turtle, as discussed above.

Mishasho was reported hunted by 15 communities. In Quechua, this word has several meanings, including "rotten" and a talisman found inside animals and may refer to carrion left by felines. No names for sloths, snakes or felines were

identified. Sloths are prohibited as food among the "Jivaro" (Meggers 1971) and Secoya (Vickers 1991:71) and the Achual and Shuar Jivaroan speakers prohibit snakes as food. In the final data set, which can be ordered from INEI, it will be possible to review faunal prey by particular ethnolinguistic groups and test ethnographic descriptions of food prohibitions (cf., Kensinger and Kracke 1981; Ross 1978), resource inventories, and other theories.

The mammals most frequently specified hunted are larger macrofauna. According to Emmons (1990), a full grown Brazilian tapir weighs 227-250 kg, each deer weighs 24-48kg, an adult collared peccary weighs 17-30 kg, and an adult ***huangana*** or white-lipped peccary weighs 25-40 kg. The collared peccary (ranked first), and the ***huangana*** or white-lipped peccary (ranked 6th) run in herds. A hunting expedition that encounters a herd of peccaries can yield meat on a par with or better than kills of larger, solitary animals like the tapir. For example, a Shipibo hunting party reported by Bergman killed 22 white-lipped peccaries in a larger herd in 105 minutes and produced 472 kg of meat (1990:118-119). The giant armadillo weighs up to 30 kg and the common, or nine-ringed, armadillo weighs 2.7 to 6.3 kg. The paca weighs five to 13 kg. The adult agouti reaches 3.5 kg and the brown capuchin monkey weighs 1.7 to 4.5 kg. The agouti is smaller than other mammals hunted by five percent or more of enumerated communities, but because it forages in groups and invades gardens, it is hunted efficiently.

Table 6 suggests the relative contribution and variety of mammal and bird meat obtained by hunting compared to raising livestock. More native communities reported they raised livestock than reported hunting (See Table 1). About half the communities that raised cattle, raised pigs, or raised both were concentrated among the "Campa" (Ashanika) who have been raising European livestock since colonial times. Only 230 Amazonian native communities reported they raise cattle while 801 reported they hunted the two largest game animals, deer, and/or tapir (" the wild cow"). The 446 native communities that reported raising domestic pigs can be contrasted with the 779 that reported hunting one or both peccaries–the wild *cerdo* pig and ***huangana***. However, almost twice as many communities (180) reported they raise turkeys than the 91 that reported hunting a wild avian counterpart in the *Cracidae*. More than seven times as many communities (1060) raised chickens than the 161 which reported hunting game birds other than Cracidae. Less than a fifth of the stock-rearing communities reported any domesticated animals other than chickens, turkeys, pigs, cattle, or pigs, and these were mainly ducks, while the 979 hunting communities gave 1,162 reports of prey other than the most frequently hunted game: deer, tapir, peccaries, guans, and birds.

SUMMARY

The 44 agricultural crops, 10 harvested cultivars, and five types of livestock specified is an impressive list of domesticated biological resources, however, the Amazonian native communities specified overall far more categories of wild biological resources than domesticated. The word lists collected in this census documented native knowledge of economic resources naturally occurring in their environment that are unknown, unrecognized, or unsuspected by other Peruvians, especially in the profusion of names for lumber and housing timbers.

The large number of biological resources named in this census corroborates ethnographic descriptions of how particular settlements and cultural groups of native peoples in the Peruvian Amazon secure their subsistence. Ethnographers have observed native Amazonians operate a subsistence strategy based on light, occasional use of individual domesticated, cultivated, and wild species for food and other necessities from a large inventory, rather than specializing, super-exploiting, or relying on a limited spectrum of living resources. This species and space extensive strategy can be contrasted with a set of equally indigenous, intensive strategies which concentrate domesticated or wild biological resources in built environments (Brownrigg 1986:93-130, 203-236). The strategy of light use from a large inventory of living resources found over a large territory through activities variously called foraging, hunting, or gathering is by no means universal among native Amazonians, nor is it the exclusive economic strategy of any Peruvian Amazonian native community reporting in this first census. The option to exercise the extensive strategy of light use of a large inventory of biological resource is increasingly constrained as native settlements and their growing populations become more sedentary to take advantage of new infrastructure and services, as national colonists and corporate extraction industries withdraw resource areas from use and access by native Amazonians, and as the habitat of the biological resources is destroyed.

RECOMMENDATIONS

For the short term, it would be useful to validate the names which the native people of the Peruvian Amazonian specified as the biological resources in their agricultural, collecting, hunting, commercial lumbering, and house construction activities in other research, surveys, and censuses in the region. From the perspective of census and survey methods, a universe of over a thousand respondents providing answers to open-ended questions is sufficiently large to establish response variations. Salient biological resources were identified by principal and variant names among culturally diverse native peoples. The more frequently reported names are useful for designing answer values and for writing questions likely to be understood. The less frequently reported names can serve to formulate probes or explanations for respondents and enumerators. By applying the same categories developed for this first census to pre-code answers in future censuses, surveys, and other research in the Peruvian Amazon, the importance and use of these categories can be tested. Use of the names and categories from this census in research in a settlement or ethnolinguistic group would permit researchers to compare local resources with native communities throughout the Peruvian Amazon region. Use of the same categories in later censuses would allow comparison to the baseline of information about the living economic resources of native communities built in this 1993 census. Use of the vocabulary and categories in systematic surveys of households or communities would allow for collection of the same or even more detailed information. In ethnobiological research, the species or set of species to which the local names refer could be detailed in particular ethnolinguistic and geographical contexts and positively identified with species.

Over the long term, I recommend departing from verbal reports to research and test standardized methods to collect and process information about biological resources from local people and scientific field observers alike. Research and development of 1) pre-coded visual aides illustrating pre-identified species and 2) standardized statistical categories for the economically important biological species address methodological problems which this census confronted. The same problems affect biological and ethnobiological research field surveys that attempt to quantify observations yet do not produce data sets suitable for sophisticated statistical analyses.

Visual aides.—Visual aides could provide respondents or local experts the same common reference. Some accurate and recognizable illustration of the taxa that are the topic of the research could help overcome the problems of synonyms, ambiguous associations between vernacular names and Linnean taxa, subjective or idiosyncratic identifications, ad-hoc coding schemes (see Heyer *et al.* 1994; Scott 1994), and communication with those respondents who are not familiar with the Spanish language yet know a great deal about indigenous biological resources. Two recent experiments tested promising methods (Phillips and Gentry 1993; Benz *et al.* 1994). Benz and his colleagues showed their informants plants in freshly pressed state. Displaying the same plant specimen to several informants served to "pre-code" and pre-identify botanical names. Fresh pressed plants, however, are too expensive and fragile to use in national censuses or random surveys of enough people to produce statistically reliable conclusions concerning distributions in populations. The native language consultants who contributed to this research could supply at least one name for accurate sketches and photographs of the Neotropical animals I showed them. This experience suggests that it may be possible to develop inexpensive, printed visual aides with biologically accurate and cognitively recognizable line drawings. Eliciting local names to identify images and descriptions issued by herbaria is another prospect, given resources increasingly available on CD-ROM and on line.

Standardized categories for biological resources.—In order to pre-define the information to be collected from local respondents and to conduct statistical analyses, standardized codes for biological resources must be developed. Codes are required for ethnobiological and scientific knowledge of the living resources to maximize computer tools and progress beyond inventory (cf., Scott 1994) and highly localized studies of populations. Variables that are precise, standardized, well defined, and documented are needed to build information systems capable of demonstrating distributions and testing effects (cf., Heyer *et al.* 1994). At a minimum, a standardized code to substitute for and reference species names is required. Latin binomial names, as alphanumeric strings, can be stored in computer data bases with other texts and images, but must be truncated to serve as variable names or values. Consistent eight place codes for species with initial digits reserved for class and order would meet common requirements for machine languages and programs. These codes could provide links—currently missing—between qualitative and descriptive information about biological resources already residing in electronic data bases and texts with new quantitative information from censuses and surveys.

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